

Remarks

Claims 1-19 are pending in the application. Claims 1-3, 6, 7 and 10-19 stand rejected as anticipated under 102(e) by U.S. patent no. 6,154,853 to Kedem. Claims 4, 5, 8 and 9 are rejected under 35 U.S.C. 103(a) as being obvious over Kedem. Claim 15 stands objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Claim 1 has been amended to make clear that creating the mirrored subsystem restores the redundancy of a redundancy group when the failed disk drive contains redundancy data for the redundancy group. To restore the redundancy of the redundancy group, the temporary disk drive of the mirrored subsystem must be loaded with the redundancy data that formerly resided on the failed disk drive. Support for this amendment is provided on page 6, lines 21-27 of the present application: "Logic in array controller 25 reconstructs each data block on failed drive A... and stores each reconstructed data block to the mirrored subsystem." A person of ordinary skill in the art would understand that the term "data block," as used consistently in the specification of the subject application, means all blocks on the failed disk drive, including both logical volumes and redundancy data. The embodiment of the invention of claim 1 creates a mirrored subsystem from the failed disk drive and a temporary disk drive. It would not be reasonable to infer that a person skilled in the art would understand that a mirrored subsystem is created and then restricted to copying only the logical volumes of the failed disk drive. No

statement to this effect is made in the specification and the temporary disk drive provides enough storage to contain all of the data from the failed drive. Further, restricting the temporary drive of the mirrored subsystem to contain less than all of the blocks on the failed drive leaves some of the data in the storage subsystem without redundancy, until the failed disk drive is replaced.

Claim Rejections --- 35 U.S.C. §102(e)

Claims 1-3, 6, 7, and 10-19 stand rejected as anticipated under 102(e) by U.S. patent ser. no. 6,154,853 to Kedem.

Kedem discloses a RAID storage subsystem with RAID groups that include redundancy data (i.e., parity), such as a RAID-5 configuration. (See, Kedem fig. 3, groups 41, 43, 45.) When a disk begins to fail, the logical volumes on the failing disk in the RAID group are copied to a spare disk drive, but the redundancy data from the RAID group is not mirrored. (See, Kedem fig. 4 and col. 4, line 63 to col. 5 line 15.) Once the failed drive has been replaced, this configuration, where only the logical volumes are mirrored, is converted back to a RAID group and the spare drives return to inactive status. This conversion process includes recreating the redundancy data (i.e. parity) for the RAID group, when the failing disk drive includes redundancy data for the RAID group, since the mirror does not include such data. See, generally, fig. 6 and col. 4, lines 48-62 of Kedem '853.

Claim 1 of the present application, as amended, requires in part:

“...creating a mirrored subsystem within the array, the subsystem including a temporary disk drive and the failed disk drive slot; and

reconfiguring the redundancy group to consist of the disk drives of the redundancy group that have not failed and the mirrored subsystem, such that the mirrored subsystem is substituted for the failed disk drive in the redundancy group and the redundancy of the redundancy group is restored, when the failed disk drive contains redundancy data for the redundancy group.

Kedem does not teach creating a mirrored subsystem that restores the redundancy of a redundancy group, when the failed drive contains redundancy data for the redundancy group. See, e.g., fig. 4 of Kedem. Failed disk drive 34 contains the redundancy data for group 45 and the mirror created does restore the redundancy of redundancy group 45. Thus, Kedem cannot anticipate claim 1.

Claims 2-3, 6, 7, and 10-15 which depend from claim 1 and add further limitations deemed not anticipated by Kedem for at least the same reasons as for claim 1.

Claim 16 of the present application requires:

“...reconstructing each data block of the failed disk drive in the redundancy group; and
writing each reconstructed data block to the mirrored subsystem.”

The cited limitations of claim 16 require reconstructing all of the data blocks of the failed disk drive. Therefore, claim 16 requires reconstructing the redundancy data blocks of the failed disk drive and writing these blocks to the mirrored subsystem. Since Kedem does not teach reconstructing the redundancy data blocks of the failed disk drive and writing these blocks to the mirrored subsystem, Kedem cannot anticipate claim 16. Claim 17 which

depends from claim 16 and adds further limitations is deemed not anticipated by Kedem for at least the same reasons as for claim 16.

Claim 18 of the present application requires:

“logic that reconstructs the data blocks on the failed drive to the mirrored subsystem.”

Since Kedem does not teach reconstructing the redundancy data blocks of the failed disk drive to the mirrored subsystem, Kedem cannot anticipate claim 18. Claim 19 which depends from claim 18 and adds further limitations is deemed not anticipated by Kedem for at least the same reasons as for claim 18.

Claim Rejections --- 35 U.S.C. §103(a)

Claims 4, 5, 8, and 9 stand rejected as obvious over Kedem '853 in view of the knowledge of one skilled in the art at the time of the invention.

Claim 4, 5, 8, and 9 depend from claim 1 and add further limitations. The rejection for obviousness relies on Kedem to teach all of the limitations of claim 1, which are incorporated in claims 4, 5, 8, and 9. As stated above, Kedem not does teach elements of claim 1, as amended. Likewise, Kedem cannot teach the elements of claim 1 that are now incorporated in claim 4, 5, 8, and 9. Therefore, claims 4, 5, 8, and 9 are deemed nonobvious over Kedem.

Claim Objection

Claim 15 stands objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Subsequent to the amendment of claim 1, Claim 15 no longer includes limitations already contained in claim 1. Thus, claim 15 is a proper dependent claim.

The Commissioner is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 19-4972. Applicants request reconsideration of the rejected claims and a notice of allowance. The Examiner is requested to telephone the undersigned if any matters remain outstanding so that they may be resolved expeditiously.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "John L. Conway", with a stylized flourish at the end.

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